

WHAT IS CLAIMED IS:

1. An inspection method for an exposure apparatus
for illuminating a photomask disposed on a first
installation member by an illumination optical system,
5 and for projecting an image of a pattern of the
photomask onto a substrate disposed on a second
installation member through a projection optical
system, the inspection method comprising:

disposing an inspection photosensitive substrate
10 as the substrate on the second installation member;

illuminating a first region which does not include
a pupil end of the projection optical system and
a second region which includes the pupil end of the
projection optical system and which is not overlapped
15 with the first region, in a state in which a surface of
the photosensitive substrate and a surface of a
secondary light source of the illumination optical
system are optically conjugate with each other; and

inspecting an illumination axis offset of the
20 exposure apparatus based on a pattern obtained by
developing the photosensitive substrate.

2. The exposure apparatus inspection method
according to claim 1, wherein the state in which the
surface of the photosensitive substrate and the surface
25 of the secondary light source of the illumination
optical system are optically conjugate with each other
is formed by providing a pattern member comprising

a pattern formed on a surface between the illumination optical system and the projection optical system or between the projection optical system and the photosensitive substrate.

5 3. The exposure apparatus inspection method according to claim 2, wherein the pattern member is an inspection photomask comprising a surface on which a pattern is formed, and the inspection photomask is provided on the first installation member so that the
10 surface of the inspection photomask is not optically conjugate with the surface of the projection substrate.

 4. The exposure apparatus inspection method according to claim 3, wherein the pattern of the inspection photomask includes a circular pattern
15 transparent relative to an exposure light.

 5. The exposure apparatus inspection method according to claim 4, further comprising disposing the inspection photomask on the first installation member while the surface on which the circular pattern is
20 provided is oriented toward the surface of the secondary light source to set the surface on which the circular pattern of the inspection photomask is formed and the surface of the photosensitive substrate not to be optically conjugate with each other.

25 6. The exposure apparatus inspection method according to claim 5, wherein a diameter of the circular pattern is 40 μm or more and 80 μm or less.

7. The exposure apparatus inspection method according to claim 4, wherein the inspection photomask is disposed on the first installation member so that the surface on which the circular pattern is formed is directed toward a pupil of the projection optical system.

8. The exposure apparatus inspection method according to claim 7, further comprising controlling a distance between the pupil of the projection optical system and the surface of the photosensitive substrate to set the surface of the inspection photomask on which the circular pattern is formed and the surface of the photosensitive substrate not to be optically conjugate with each other.

9. The exposure apparatus inspection method according to claim 7, wherein the photosensitive substrate comprises a transparent substrate relative to the exposure light and a reflection film provided on a surface of the substrate opposite to a surface of the substrate on which the exposure light is incident and reflecting the exposure light.

10. The exposure apparatus inspection method according to claim 7, wherein the diameter of the circular pattern is 1 μm or more and 20 μm or less.

11. The exposure apparatus inspection method according to claim 1, wherein the photosensitive substrate comprises a silicon wafer, and a photoresist

applied onto the silicon wafer.

12. The exposure apparatus inspection method according to claim 2, wherein the pattern member is a lens member, and the lens member is disposed in
5 an optical path between the surface of the secondary light source of the illumination optical system and the projection optical system or in an optical path between the projection optical system and the photosensitive substrate.

10 13. The exposure apparatus inspection method according to claim 1, further comprising setting an illumination shape of the secondary light source in a zonal pattern by illuminating the second region when the photosensitive is exposed.

15 14. The exposure apparatus inspection method according to claim 1, further comprising setting an illumination shape of the secondary light source in a shape which has maximums of brightness in three or more directions when the photosensitive is exposed.

20 15. The exposure apparatus inspection method according to claim 13, wherein the illumination shape of the secondary light source on a pupil surface of the projection optical system satisfies an inequality of $NA_{i1} > NA_{in} > NA_{i2}$, where NA_{in} is an incident-side numerical aperture of the projection optical system,
25 NA_{i1} is an emission-side numerical aperture of the illumination optical system, and NA_{i2} is a value

representing an incident angle of a light corresponding to an inner periphery of the secondary light source by a numerical aperture dimension.

16. An exposure apparatus comprising:

5 a first installation member on which a photomask is disposed;

 an illumination optical system for illuminating a pattern formed on the photomask disposed on the first installation member;

10 a second installation member on which a substrate is disposed;

 a projection optical system for projecting the image of the pattern of the photomask onto the substrate disposed on the second installation member;
15 and

 a lens member arranged into an optical path between a surface of a secondary light source of the illumination optical system and the projection optical system or into an optical path between the projection
20 optical system and the substrate.

17. The exposure apparatus according to claim 16, wherein the lens member is provided at a position away from an upper part of a surface of the photomask by a predetermined distance in a direction perpendicular
25 to the surface of the photomask or provided at a position away from an upper part of a surface of the substrate by a predetermined distance in a direction

perpendicular to the surface of the substrate.

18. The exposure apparatus according to claim 17, wherein the predetermined distance is substantially equal to a focal length of the lens member.

5 19. The exposure apparatus according to claim 16, wherein the lens member comprises a substrate including a main surface and a plurality of lenses provided on the main surface of the substrate, and disposed so that the main surface of the substrate is parallel to
10 a surface of the photosensitive substrate.

20. The exposure apparatus according to claim 19, wherein a region of the main surface of the substrate in which the plurality of lenses are not provided shields an exposure light.

15 21. The exposure apparatus according to claim 16, further comprising a retraction member which retracts the lens member to an outside of an optical path of an exposure light.